

## **POLE FOR HAND PALLET TRUCK**

### **BACKGROUND OF THE INVENTION**

#### **1. Field of the Invention**

This invention relates to a hand pallet truck.

#### **2. Technical Background**

In conventional hand pallet trucks, the pole is used to steer and move the vehicle, as well as to pump for lifting a load. To operate the lifting apparatus, especially to lower the load, an operating element is required which should be easily accessible, and allow switching between the functions of lifting and driving as well as sensitive lowering of the load.

Easy accessibility of the operating element is especially important for effective operation of the hand pallet truck when pulling the vehicle, i. e. when the pole is an inclined position in front of the vehicle. By contrast, actuating the functions with upright pole, i. e. when the vehicle is being pushed, is less important, because in most cases the vehicle is drawn out of the pallet, thereby returning the pole into the inclined position.

For pumping and moving the vehicle, it is of advantage if the pole handle is centrally grippable in order to avoid unnecessary steering as well as frictional forces. At the same time, the actuating forces at the operating element should be as small as possible in all situations requiring a longer actuating path, which might be realized by providing a longer distance between the circle point and the lever pivot point, for example.

It is known to use an extension of the pole bar traversing the handle as a mounting component for an operating lever extending to the sides. This known pole handle has the drawback that it cannot be gripped centrally. From DE 297 10 503 U1 it is further known to pivotally mount a control lever at the upper end of the portion of

the bar extending into the handle. The lever must be pushed away from the operator to achieve a lowering of the load. Pulling the lever towards the operator will result in a switch to the lifting function. A drawback of this design is that the operator cannot actuate the functions well while pulling the vehicle because the control lever has to be pulled upwards to achieve a lowering action. Further, since the operating element is not familiar from other technical devices, it is less suitable for intuitive operation. The actuating forces are great due to the small distance between the circle point and the lever pivot point.

Apart from the above described possibility of operating a hand pallet truck, it is also common to provide it with an integrated handbrake. In this context, it is known from EP 1 186 511 A2 to pivotally mount an operating lever on either side of a holding extension traversing the handle of the pole in prolongation of the pole. One operating lever is connected to a traction or pushing element for the lifting apparatus and the other one with a traction or pressure element for a brake. Actuation of the lifting apparatus is effected such that pulling of the operating lever initiates a lowering operation in the lifting apparatus while a push opens up the possibility to effect a lifting operation by pumping on the pole. Pushing the other operating lever leads to braking of the vehicle wherein the extent of the pivotal movement determines the braking power. This known arrangement further provides for a locking/unlocking lever which is also pivotally mounted on the holding extension and has a projection cooperating with a recess of the brake operating lever when the brake operating lever has reached a given hind position. Thus a parking brake is created which is released by pivoting the locking and unlocking lever in the opposite direction. Thereby the brake operating lever may return to its initial position by means of spring bias from the direction of the brake. Finally, the known arrangement also provides that the

parking brake is released by actuating the other operating lever. In other words, when actuating the lowering operation, the parking brake is automatically released.

In the hand pallet trucks described above, the brake is usually optional. Depending on whether a brake is present or not, different handle arrangements have to be provided, thereby complicating the production process.

An object of the invention is to configure the pole head in a pole for a hand pallet truck such that it may optionally receive a brake operating device. When no brake is present, an especially ergonomic actuation of the lifting apparatus is desired.

#### SUMMARY OF THE INVENTION

According to the invention, the inside of the housing for the operating device is arranged identically, whether an integrated brake is provided or not. To this end, two identical mounting places are provided in the housing, on each of which an operating lever may be pivotally mounted. If a brake is integrated, one of the operating levers is a brake operating lever while the other lever actuates the lifting apparatus. If the brake is omitted, in general only one operating lever is required for operation. However, a coupling mechanism is provided in the inside of the housing allowing the provision of an identical operating lever on the other side for actuating the lifting apparatus. Hence, it is possible to drive the lifting apparatus either by actuating one or both operating levers at the same time, wherein movement in one direction initiates the lowering operation and a movement in the other direction initiates the lifting operation. As is ergonomically intuitive, pulling at one or the other or both operating levers initiates the lowering operation.

Therefore the invention allows to manufacture a pole head with operating device which is simple and constructed in an identical fashion, independent of whether a brake has to be actuated or not.

The invention also provides a particularly simple and effective design for the actuation of the traction or pushing element for the brake. To this end, an interlock portion with a toothing is disposed inside the housing and a catch is movably mounted on the brake lever and engages the toothing, whereby the brake lever can be locked in different pivotal positions. A blocking and unblocking lever also mounted within the housing of the operating device actuates the catch to disengage it from the toothing. The catch and/or the blocking and unblocking lever is biased by a spring. This solution of the invention has the advantage that the brake lever is self-locking over the entire actuating path in several defined positions up to the end position at maximal braking action, i. e. letting go off the brake lever in a certain position leads to the braking force being kept up. Since all actuation components apart from the actuating portions of the operating levers are disposed inside the housing, the design is optically appealing. In addition, the risk of parts being damaged and thereby becoming non-functional is reduced.

The actuating portion of the three possible operating levers may have the same shape or may be shaped differently. However, it is of advantage if - according to one embodiment of the invention - the material, the colour or the surface quality of the actuating portion for the brake lever differ from the corresponding properties of the other operating levers, so that the operator may recognize at first glance which lever is for braking and which lever is for actuating the lifting apparatus. A corresponding indication may also be achieved by differing shapes of the actuating portions.

The inner portions of the levers preferably cross each other, so that the pivot point for one operating lever is disposed on the opposite side of the axis extending in prolongation of the pole through the housing. In this way, high lever action may be achieved, i.e. a relatively great actuating force may be achieved with little expenditure of force.

**BRIEF DESCRIPTION OF THE DRAWINGS**

Further advantages of the invention shall become apparent from the following description in connection with the accompanying drawings, in which

Fig. 1 shows a top view of a pole head of a hand pallet truck including an operating device according to the invention;

Fig. 2 shows a cross-sectional view through the device of Fig. 1 taken along line 2-2;

Fig. 3 shows a top view of a part of the pole head of Fig. 1, with the upper shell of the housing of the operating device removed;

Fig. 4 shows a perspective view similar to that of Fig. 3, but including a brake operating lever;

Fig. 5 shows the brake operating lever of Fig. 4 including an interlock portion; and

Fig. 6 shows the bottom view of the brake operating lever of Fig. 5 and the interlock portion.

**DETAILED DESCRIPTION**

Fig. 1 shows a bar 10 of a pole generally indicated at 12. Only the section 10 and a loop-shaped handle 14 of the pole are shown. The other end of the pole bar 10 is connected or linked to the pillow block of a steered wheel of a hand pallet truck (not shown) for the purpose of manipulating the hand pallet truck accordingly. As usual, the hand pallet truck includes a pump for lifting the load carrying means and a valve arrangement for lowering the load carrying means.

As usual, the handle 14 is formed by a suitably curved tube defining a plane in which is also disposed the axis of the bar 10. The bar 10 projects into the interior of

the handle 14, thereby forming a holding extension 16. This holding extension comprises a tube section 18 and a housing 20 which have been mounted and fastened on the tube section 18. Details about this process will be described below.

In the housing, two operating levers 22, 24 are pivotally mounted for actuation of the lifting and lowering functions of the hand pallet truck (not shown). Details of these levers 22, 24 and their mountings are apparent from the further figures.

As shown by the arrows 26, 28, the levers may be pivoted in both directions in a plane coinciding with or parallel to the plane of the handle 14. Attention is drawn to the fact that the distance between the housing 20 or the extension 16 and the rear portion 30 of the handle 14 is such that the rear portion of the handle 14 may be gripped by hand in any position.

As shown in Fig. 2, the housing 20 consists of an upper shell 32 and a lower shell 34, the dividing plane 36 of the two shells being disposed in the central plane of the handle 14. The left part of the housing 20 is formed by a socket portion receiving the tube section 18 in order to attach the housing 20.

As is apparent from Fig. 3 and the following figures, the two operating levers 22, 24 have the same slight S-form. The curved actuating portions 38, 40 of the operating levers 22, 24 project through side slots 42, 44 in the housing 20 towards the outside. The curvature of portions 38, 30 is such that the convex sides face the operator and the concave sides face the pole bar, as is readily apparent from the drawings. The inner portions 36, 48 of the operating levers 22, 24 are curved in opposite directions and are pivotally mounted at pivot points 50, 52 in the housing 20, respectively. Mounting is effected for example by means of a bearing journal extending through a hole in either portion 46, 48. The holes are disposed nearly at the end of portions 46, 48.

The operating levers 22, 24 shown in Fig. 3 in the neutral position may be pivoted upwards as well as downwards in Fig. 3. A stop to the pivotal movement is provided but not shown in detail.

As is apparent from Fig. 3 and the further figures, each lever portion 46, 48 has a toothed portion having two teeth 54, 56. The toothed portions of the two lever portion 46, 48 cooperate with a toothed rack 58 attached to a shifting element 60 which is mounted such that it is linearly movable in the axis of bar 10 in the housing 20. The toothed rack portion 58 includes two teeth 62, 64 on each of its opposing sides, which cooperate with the corresponding teeth 54, 56 of lever portions 46, 48, respectively.

A traction rope 66 is attached to the opposite end of the shifting element 60, the traction rope being in turn connected to corresponding control devices in the hand pallet truck.

Referring to Fig. 3, the function of the lever mechanism for actuating the traction rope 66 shown in the figures will now be explained.

If a lever is pivoted in the direction of arrow 26, i. e. towards the operator or handle portion 30, as shown in Fig. 4, the toothed rack portion 58 will be displaced by tooth 56 in the direction of the operator. This causes rope 66 to perform a traction movement, the displacement being indicated by the distance d between the broken and full lines in Fig. 4. The broken line indicates the neutral position as shown in Fig. 3. It is apparent that the same operation is achieved when both levers 22, 24 are pulled. If one lever is pulled further than the other, the displacement of the lever pulled furthest is decisive. The extent of deflection of the traction element 66 determines the lowering speed of the load carrying means of the hand pallet truck (not shown).

If the pulled lever is released, it returns to the neutral position according to Fig. 3 by means of a suitable restoring device. For this purpose, spring means may be

provided in suitable positions. It is also conceivable to lock the levers 22, 24 lightly in the neutral position in order to prevent a slight touch from triggering a function.

The lever 22 remains in its neutral position when the lever 24 is being pivoted for the purpose of triggering a lowering function. With respect to the lowering function, the operating levers 22, 24 are independent.

If a lever 22 or 24 is being pushed, i.e. pivoted away from the operating person, the shifting element 60 will be pushed in the same direction. This initiates a lifting function. The displacement of rope 66 relative to the neutral position is indicated at d'. Now lifting of the load carrying means may be effected by "pumping" with the pole bar 10.

Teeth 56, 56 engage the toothing of toothed rack portion 58 such that a displacement of the toothed rack portion 58 caused by an actuation of one lever leads to pivoting of the other lever as well. Actuating one operating lever 22, 24 in the direction away from the operator therefore leads to synchronous displacement of both levers. Hence, it would also be possible to actuate both levers. Due to this synchronous displacement, the operator may recognize the operating position of the actuating device.

It may happen that one operating lever is being pulled and the other one is being pushed. As is apparent from the drawings, this will activate the function corresponding to the lever on which the greatest force is exerted.

However, if one lever 24 is being pulled, pushing the other lever 22 is not possible because this lever 22 will be blocked by lever 24 through an interlocking of teeth.

As far as the same parts as in Fig. 3 are shown in Fig. 4, the same reference signs are used. It is apparent that, with respect to Fig. 3, the second operating lever 22 has been removed and in its place an operating lever 70 including an actuating portion

72 and an inner portion 74 has been provided. The inner portion 74 is pivotally mounted at the same mounting place 50 where, in the embodiment of Fig. 3, the operating lever 22 was pivotally mounted. The housing is arranged such that the operating lever 22 may easily be replaced by the operating lever 70 and the other way round. The actuating portion 72 may have the same geometry as the actuating portion 38 of Fig. 3, alternatively it may be shaped differently or have a different surface or colour so that the operator may distinguish between levers 24 and 70 with respect to their function.

As is also apparent from Fig. 4, a brake rope 76 is attached to a middle portion of the operating lever 70 at 78. Pulling the operating lever 70 causes actuation of the brake of the hand pallet truck (not shown). The brake rope 76 is preferably accommodated in the tubular pole bar (not shown).

As further shown in Fig. 4, inner portions 48 and 74 of levers 24, 70, respectively, extend through the displacement element 60 in order to cross there. Only the lower part of the displacement element 60 may be seen in Fig. 3. This has no bearing on the function, excepting the fact that the levers 24, 70 also cross there in order to be able to achieve a great lever force.

The third lever acting as locking and unlocking lever 80 is pivotally mounted at 82 on lever 70. For this purpose, lever 70 is reduced in thickness in the mounting area, so that the locking and unlocking lever 80 may also project through the slot 42 of housing 20. A spring 84 urges or biases the lever 80 in anticlockwise direction. The other end of the spring 84 is fixed at lever 70.

Inside the housing is disposed a plate-shaped interlock portion 86 having a saw toothing 88. It may be removable in case a brake actuation is not desired.

Fig. 5 merely indicates a bearing bush 90 of the inner portion 84 of lever 70 for mounting at pivot point 50 according to Fig. 4.

On the same shaft as the locking and unlocking lever 80 is mounted a catch 92 on lever 70. The pivot point is indicated at 94. Due to the bias of the locking and unlocking lever 80, the catch 92 is always pivoted against toothing 88, so when pulling at operating lever 70, the catch 92 ratchets along the toothing 88 and lockingly engages the tooth space to which the catch 92 is aligned at the moment when the pivotal movement of lever 70 is ended. Thereby the operating lever 70 may be locked in several positions to keep the braking force constant at the set value. The operator may unlock the lock by actuating the locking and unlocking lever 80 and pivoting it in clockwise direction in Fig. 5. This causes the catch 92 to pivot in anticlockwise direction and disengage with the toothing 88. The spring of the brake may return the operating lever 70 to its original position.

In the housing, appropriate stops to limit the displacement of the operating levers may be provided.